

Table 4.12

Comparison of Estimated Pollutant Loading Rates for the Existing SR 520 Bridge and Proposed Replacement Bridge Alternatives (Equivalent Bridge Section Lengths)

	Pollutants							Parameters/Assumptions ^a
	Units	TSS	Oil/Grease	Cadmium	Copper	Lead	Zinc	
Average Event Mean Concentration^b (EMC)	mg/L	94.4	9.47 ^c	0.005	0.022	0.022	0.130	Eq 8: $C_m = C_{med} * (1+CV^2)^{0.5}$; Cadmium is max. runoff conc.
Runoff Coefficient		0.8	0.8	0.8	0.8	0.8	0.8	$RV = 0.007 * \% \text{ Impervious Area} + 0.10$, % Imp Area = 100%
Rainfall Volume for the Mean Storm Event	mm	11.7	11.7	11.7	11.7	11.7	11.7	Table 13, p. 55, Seattle
Road Surface Area (Equivalent Bridge Lengths)								
Existing SR 520 Bridge	ha	0.101	0.101	0.101	0.101	0.101	0.101	Single direction, 26 ft wide, 420 ft length
4-lane Alternative	ha	0.148	0.148	0.148	0.148	0.148	0.148	Single direction, 38 ft wide, 420 ft length between lagoons
6-lane Alternative	ha	0.234	0.234	0.234	0.234	0.234	0.234	Single direction, 60 ft wide, 420 ft length between lagoons
8-lane Alternative	ha	0.281	0.281	0.281	0.281	0.281	0.281	Single direction, 72 ft wide, 420 ft length between lagoons
Volume of Runoff for Mean Storm Event								
Existing SR 520 Bridge	m ³	9.5	9.5	9.5	9.5	9.5	9.5	Eq 7: $V_{ms} = RV * H_{ms} * A * 10$
4-lane Alternative	m ³	13.9	13.9	13.9	13.9	13.9	13.9	
6-lane Alternative	m ³	21.9	21.9	21.9	21.9	21.9	21.9	
8-lane Alternative	m ³	26.3	26.3	26.3	26.3	26.3	26.3	
Mean Event Mass Load								
Existing SR 520 Bridge	kg/event	0.896	0.090	0.000	0.000	0.000	0.001	Eq 9: $L_m = C_m * V_{ms}/1000$
4-lane Alternative	kg/event	1.310	0.131	0.000	0.000	0.000	0.002	
6-lane Alternative	kg/event	2.069	0.208	0.000	0.000	0.000	0.003	
8-lane Alternative	kg/event	2.482	0.249	0.000	0.001	0.001	0.003	
No. of Storms Per Year	events/yr	86.7	86.7	86.7	86.7	86.7	86.7	$N_s = 24 * 365/T_s$ where $T_s = \text{interval mean} = 101$, Table 13, p. 55, Seattle
Annual Mass Loading (Metric Units) Without BMP Applied								
Existing SR 520 Bridge	kg/yr	77.75	7.80	0.00	0.02	0.02	0.11	Eq 10: $L_a = L_m * N_s$
4-lane Alternative	kg/yr	113.63	11.40	0.01	0.03	0.03	0.16	
6-lane Alternative	kg/yr	179.42	18.00	0.01	0.04	0.04	0.25	
8-lane Alternative	kg/yr	215.30	21.60	0.01	0.05	0.05	0.30	
Annual Mass Loading (English Units) Without BMP Applied								
Existing SR 520 Bridge	lb/yr	172.77	17.33	0.01	0.04	0.04	0.24	1 lb force = 4.45 N = 1 kg * 9.8 m/s ²
4-lane Alternative	lb/yr	252.51	25.33	0.01	0.06	0.06	0.35	
6-lane Alternative	lb/yr	398.70	40.00	0.02	0.09	0.09	0.55	
8-lane Alternative	lb/yr	478.44	48.00	0.03	0.11	0.11	0.66	
Removal Efficiencies Applied (Average in Efficiency Range)								
Existing SR 520 Bridge ^d	%	44.5	37.5	40.0	26.5	40.0	26.5	1 lb force = 4.45 N = 1 kg * 9.8 m/s ²
4-lane Alternative ^e	%	82.0	57.5	77.5	65.5	77.5	63.0	
6-lane Alternative ^e	%	82.0	57.5	77.5	65.5	77.5	63.0	
8-lane Alternative ^e	%	82.0	57.5	77.5	65.5	77.5	63.0	
Annual Mass Loading With Alternative 4 Removal Efficiencies Applied								
Existing SR 520 Bridge	lb/yr	95.89	10.83	0.01	0.03	0.02	0.17	1 lb force = 4.45 N = 1 kg * 9.8 m/s ²
4-lane Alternative	lb/yr	45.45	10.77	0.00	0.02	0.01	0.13	
6-lane Alternative	lb/yr	71.77	17.00	0.00	0.03	0.02	0.20	
8-lane Alternative	lb/yr	86.12	20.40	0.01	0.04	0.02	0.24	

^a Source: Federal Highway Administration. June 1996. Evaluation and Management of Highway Runoff Water Quality. Federal Highway Administration Method for Estimating Pollutant Loading, Section 3.2.3, p. 52.

^b Source: Kayhanian M., Hollingsworth L., Sponberg M., Regenmorte L., and K. Tsay. Jan. 2002. Characteristics of Stormwater Runoff from CalTrans Facilities. Transportation Research Board, Annual Conference, Washington D.C. Table 3. Note that the maximum cadmium concentration was used in this analysis rather than the mean.

^c Source: Federal Highway Administration. March 1985. Effects of Highway Runoff on Receiving Waters, Vol. III, Resource Document for Environmental Assessments. Publication No. FHWA/RD-84/064.

Table 1. Summary of highway runoff quality data for six monitoring sites and typical urban runoff quality based on data from 28 cities: average pollutant concentration.

^d BMP maintenance on the existing SR 520 Bridge is bi-monthly conventional sweeping.

^e Efficiencies applied to proposed alternatives are average composite efficiencies from Alternative 4, High Efficiency Sweeping plus Modified Catch Basin Cleaning.

Abbreviations: ha = hectare; m³ = cubic meter; kg = kilograms; lb = pound; mg/L = milligrams per liter; mm = millimeters; yr = year